

# Automated Mapping Information for ALTO

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# Problem Statement

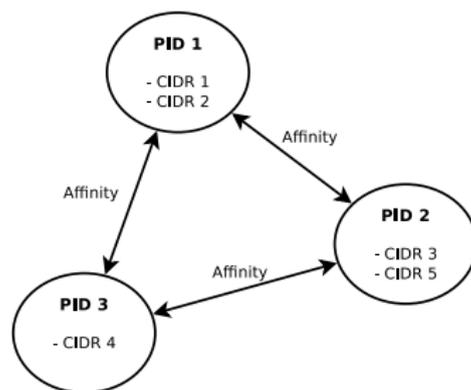
## Why automate mapping generation?

- Complexity:
  - Thousands of routers (> 3400 in large ISP)
  - Thousands of (IGP) links (> 10000 in large ISP)
- Diversity:
  - Different customers
  - Different mapping engines
  - Different requirements
  - Different capabilities
  - Different detail levels
- Actuality:
  - Changes in network should be available ASAP

**There is no one size fits all**  
**Not manually handable**

# Getting started

- Network Map
  - CIDRs
  - Grouping Criteria
- Cost Map
  - Affinity Criteria



What do we need to automatically generate mapping information?

**Data, Data and Data**

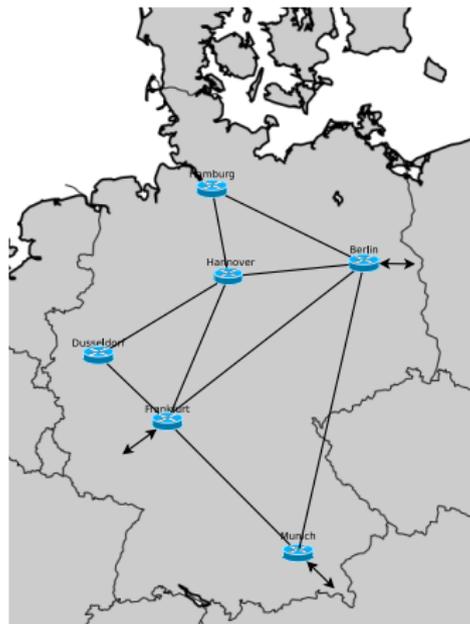
# CIDRs and Topology

- Sources → Routing Protocols
- IGP (ISIS/OSPF)
  - Topology
  - CIDRs
- BGP
  - Internal CIDRs (iBGP)
  - External CIDRs (eBGP)

Data from one BGP router might not be enough

→ Multi peering points with other networks (e.g. CDN)

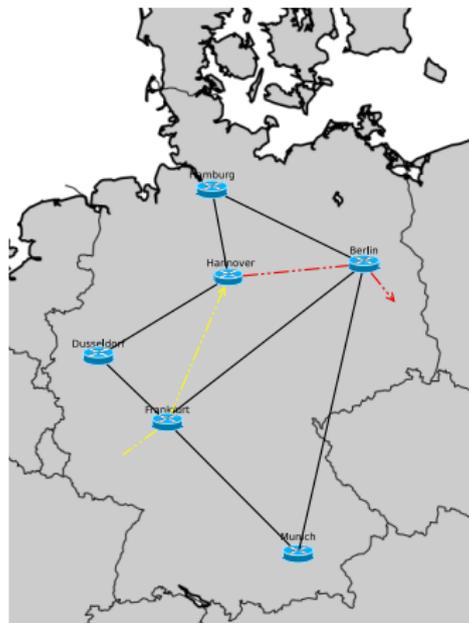
→ Information from (all) edge routers necessary



## CIDRs and Topology II

Now we can start generating maps → Sorry, not yet

- View ends on network border
- From ISP perspective: Most traffic come from outside the network
- Problem: Routing Protocols only tell us forward path  
→ how to get to CIDR
- network entry point cannot be derived from routing protocols

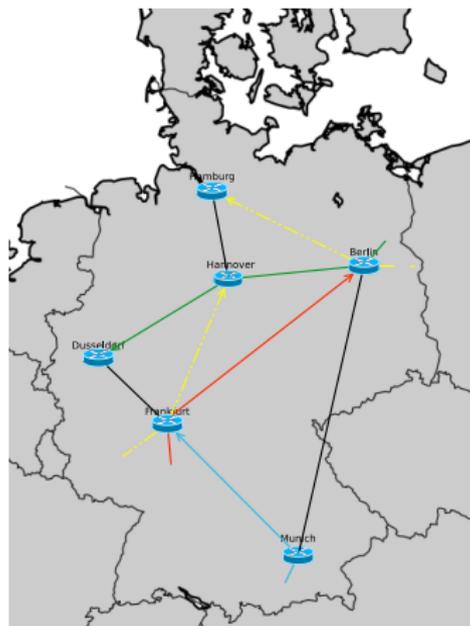


**Mechanism to detect where flows enter the network required**

# Detecting Ingress Points

- Passive Measurement
  - Processing flow information (Netflow, sFlow)
  - Collect flow information on **all** border router interfaces
  - Statistically evaluate flow records to find common subnet ranges
  - Provides CIDR, router + interface information

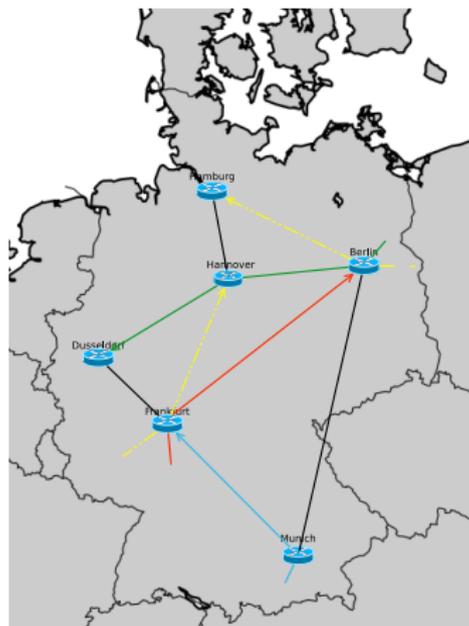
→ Very heavy operation



# Detecting Ingress Points II

- Active Measurement
  - Content provider detects ingress router by tracing paths to client
    - First router in target network
    - Detectable via IP, host name
    - Counter part to own border router in private peering
  - Channel into ALTO server to provide ingress points

**Idea: Integrate such information into ALTO Map requests**



## **Integrate information into ALTO Map requests**

- Network/Cost Map requests provide additional information  
→ E.g. Ingress Points
- Network/Cost Map request must support HTTP POST requests
- Maps cannot be (fully) precalculated anymore  
→ Calculation must be efficient

Is this something worth pursuing?

# Additional Data

Now we can start generating maps → yes, but ...

Depending on requirements additional data might be necessary

- Performance stats (e.g. from SNMP)
- Geoinformation
- Content server information
- Type of Content
- ...

# Summary

- Manual maps design not feasible due to complexity, diversity and actuality
- A lot different data sources required
- Routing protocols alone are not enough  
→ Ingress Points necessary for external sources
- Potential future work: Integrate processing relevant information in ALTO requests

Thank You

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